

U.S. Serial No. 10/540,783

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REMARKS

Claims 1-23 are cancelled, and new claims 24-57 are added in this amendment. New claims 24-57 are supported in the specification and the claims as filed. No new matter is added.

In the Office Action mailed on June 27, 2006, claims 10-23 were objected to under 37 CFR 1.75(c) as being in improper form. Claims 1-4 and 6-9 were rejected under 35 U.S.C. §112 second paragraph as being indefinite. Claims 1-23 have been cancelled by this amendment and new claims 24-57 have been added. The new claims render the objection under 37 CFR 1.75(c) and the rejection under 35 U.S.C. §112 moot.

Claims 1-3, 8 and 9 were rejected under 35 U.S.C. §102(b) as being anticipated by Müller et al., U.S. Patent No. 4,410,589. Claims 6-7 were rejected under 35 U.S.C. §103(a) as obvious based upon Müller in view of Custer, U.S. Patent No. 6,103,000. Claims 4-5 were rejected under 35 U.S.C. §103(a) based upon Müller in view of Custer, and in further view of Chatterjee, U.S. Patent No. 5,667,577.

The Examiner also stated that claims 1-7 of the present application conflict with claims 26-33 of Application No. 10/972,598, and requested cancellation of the claims in one of the applications pursuant to 37 CFR 1.78(b).

Claims 1-7 were provisionally rejected on the grounds of obviousness-type double patenting over claims 26 and 29-33 of copending application No. 10/972,598. Claim 1 was rejected on the grounds of non-statutory obviousness-type double patenting over claim 6 of U.S. Patent No. 6,808,558.

For at least the reasons set forth below, new claims 24-57 are patentable over the prior art cited by the examiner, and new claims 24-57 recite claims that are patentably distinct over the claims of application no. 10/972,598, now U.S. Patent No. 7,094,283, and U.S. Patent No. 6,808,558.

As recited in the specification and in new claims 24-35, in one embodiment, the present invention is directed generally to processes for improving the physicochemical properties of bitumen by combining the bitumen with a functionalized amorphous silica. Amorphous silica is combined with a coupling agent to produce a functionalized amorphous silica. The functionalized amorphous silica is mixed with the bitumen to produce the improved bitumen product. The bitumen may be heated to a temperature of between about 120°C to about 190°C prior to mixing the functionalized amorphous silica with the bitumen. Aggregate may be added to the modified bitumen product to produce a composition useful for paving roadways.

U.S. Serial No. 10/540,783

99342.00063

As recited in new claims 36-46, in another embodiment, a bitumen emulsion is formed by mixing bitumen, water and an emulsifier. The functionalized amorphous silica is combined with the bitumen emulsion. The bitumen emulsion is spread to obtain a substantially uniform coating, and the emulsion is broken.

In yet another embodiment recited in new claims 47-57, bitumen is heated to a temperature of between about 120°C to about 190°C prior to mixing the functionalized amorphous silica with the bitumen. The bitumen/functionalized silica mixture is then mixed with water and an emulsifier to produce a bitumen emulsion. The bitumen emulsion is spread to obtain a substantially uniform coating, and the emulsion is broken.

Rejection Under 35 U.S.C. §102(b)

Original claims 1-3, 8 and 9 were rejected under 35 U.S.C. § 102(b) over Müller, U.S. Patent No. 4,410,589. Müller describes a process for improving asphalt compositions by addition of silica to the asphalt. The silica used in the process described by Müller may be a precipitated silica, a precipitated and spray dried silica, or pyrogenically produced silica. According to Müller, the added silica increases the hollow space in the asphalt, which improves the performance of the asphalt. Col. 5, lines 5-34.

In order to anticipate a claim under 35 U.S.C. §102(b), all of the limitations of the claim must be disclosed in a single prior art reference. MPEP §2131; Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987). Müller does not describe, teach or suggest the addition of a functionalized amorphous silica to bitumen as recited in new claims 24-57. All of the silica added to the bitumen in Müller is silica which has not been treated to functionalize the silica. As described in the specification and recited in the claims, the present invention utilizes an amorphous silica that is functionalized using a coupling agent such as an alkylsilicon, an amino-silicon, a thiosilicon or an epoxysilicon. Because Müller does not describe the use of a functionalized amorphous silica in bitumen, Müller does not anticipate new claims 24-57 under 35 U.S.C. § 102(b).

Rejections Under 35 U.S.C. §103(a)

Original claims 6 and 7 were rejected based upon Müller in view of Custer, U.S. Patent No. 6,103,000. As discussed above, Müller does not describe, teach or suggest addition of a functionalized amorphous silica to bitumen. Custer describes a surfactant mixture for use in preparing bitumen emulsions. Custer does not describe addition of any type of silica to the bitumen emulsions, much less describe an emulsion containing a functionalized amorphous silica as recited in new claims 24-57. To establish obviousness under 35 U.S.C. § 103, all of the

U.S. Serial No. 10/540,783

99342.00063

limitations of the claim must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981 (CCPA 1974); MPEP § 2143.03. Because neither Müller nor Custer describe, teach or suggest the use of functionalized amorphous silica, the combination of Müller and Custer does not have all of the elements recited in new claims 24-57. Accordingly, claims 24-57 are allowable over the combination of Muller and Custer for at least this reason.

Original claims 4 and 5 were rejected under 35 U.S.C. §103(a) based upon Müller in view of Custer and in further view of Chatterjee, U.S. Patent No. 5,667,577. As discussed above, the combination of Müller and Custer does not render new claims 24-57 obvious at least because the references do not describe, teach or suggest use of a functionalized silica to improve the properties of bitumen. Chatterjee does not address this deficiency in Müller and Custer.

Chatterjee describes amphoteric emulsifiers for use in preparing bitumen emulsions. Chatterjee does not address any additives to the bitumen component to improve the properties of the bitumen. In particular, Chatterjee does not teach, suggest or describe the use of a functionalized amorphous silica to improve the properties of the bitumen. Because none of Müller, Custer and Chatterjee describe, teach or suggest the use of a functionalized amorphous silica, any combination of these references necessarily does not include this element recited in new claims 24-57. Accordingly, claims 24-57 are patentable over Muller, Custer and Chatterjee under 35 U.S.C. §103(a).

#### Rejection Based upon 37 CFR 1.78(b)

Original claims 1-7 were rejected under 37 CFR 1.78(b) as conflicting with claims 26-33 of application serial no. 10/972,598, now claims 1-8 of U.S. Patent No. 7,094,283 ("the '283 patent"). The '283 patent is directed toward methods of preparing bituminous products using an additive comprising phosphoric or polyphosphoric acid supported on a high porosity mineral oxide. The '283 patent does not describe or claim methods for preparing bituminous products using a functionalized amorphous silica, and in particular does not describe the use of coupling agents, as described in the specification and recited in new claims 24-57. Accordingly, new claims 24-57 of the present application do not conflict with claims 1-8 of the '283 patent.

#### Rejections Based Upon Non-Statutory Double Patenting

Original claims 1-7 were rejected based upon non-statutory obviousness type double patenting over several claims of the '283 patent. As discussed above, the '283 patent does not describe, teach or suggest use of a functionalized amorphous silica to improve the properties of the bitumen formulation. Although the '283 patent describes precipitated silica as one of the porous metal oxides that can be used in combination with a phosphoric acid, the '283 patent does

U.S. Serial No. 10/540,783

99342.00063

not describe, teach or suggest a functionalized silica, and in particular the '283 patent does not describe, teach or suggest functionalizing the silica using a coupling agent. Accordingly, for at least this reason, new claims 24-57 are not obvious in view of the claims of the '283 patent, and the rejection based upon non-statutory type double patenting should be withdrawn.

Original claim 1 was rejected on the grounds of obviousness-type double patenting over claim 6 of U.S. Patent No. 6,808,558 ("the '558 patent"). The '558 patent is the parent of the '283 patent, and for the same reasons discussed above, new claims 24-57 are not obvious in view of claim 6 of the '558 patent.

Because the reasons above are sufficient to traverse the rejections in the Office Action, Applicant has not explored, nor does he now present, other possible reasons for traversing such rejections. Nonetheless, Applicant expressly reserves the right to do so, if appropriate, in response to any future Office Action.

The Examiner is invited to contact Applicant's Attorneys at the below-listed telephone number regarding this Response to Office Action or otherwise regarding the present application.

A petition for a one month extension of time extending the time for response from September 27, 2006 to October 27, 2006 with the associated fee has been filed herewith. No additional fee is believed to be required. However, if any additional fee is required, or otherwise if necessary to cover any deficiency in fees already paid, authorization is hereby given to charge our Deposit Account No. 50-3569.

Respectfully submitted,

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